

# THE VAN NOSTRAND CHEMIST'S DICTIONARY

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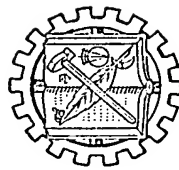
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## PREFACE

THE CHEMIST'S DICTIONARY is designed to provide the widest possible coverage of the terms in which chemists are most commonly interested. The book includes, therefore, definitions of all the group terms of chemical stances; the elements, the ions, the radicals, the type-compounds and the compounds of chemical substances are defined in light of present-day nomenclature. The book also gives definitions of the laws, reactions, mathematical equations, fundamental entities; the presentation extends into physics and other sciences when necessary to meet the needs of the chemist. Proper names are included as well as common names—a policy that has been followed not only in reference to the scientific terms, but for the many applications of chemistry.

A feature that facilitates ready reference is the KEY WORD PLAN of indexing. Each topic is defined as far as possible in basic terms, and then every important point in the explanation that is further defined elsewhere in the book is printed in bold-face type to serve as a reference to the article on that subject.

The applications of chemistry include names of industrial processes and laboratory equipment. Coverage of definitions of the chemical tests, reactions, and reagents is provided. Since very many important tests and solutions, as well as laws, equations and reactions, are best known by the names of the men to whom they are accredited, the large number (more than 5000) of proper name entries are a valuable feature of this book. Both the common-name and the proper-name terms basic to many phases of pure and applied chemistry are brought together for convenient reference.

While the inclusion of the terms of applied chemistry, even though they number several thousand, has required the most exacting and often arbitrary selection, the result will be, it is hoped, sufficiently useful to the vast majority of chemists to justify the obvious omissions if the book is viewed from the standpoint of a single, highly specialized field. In fact, the primary objective of the Dictionary is to furnish to the specialist in any one field the information needed up to the level of the specialist. To accomplish this purpose the definitions have been written, as far as possible, in the most commonly used terminology of atomic entities, for example, are discussed either in the language of quantum mechanics or the "classical language" in accordance with the most common usage of the particular term. The same pragmatic viewpoint has determined the other editorial policies in the preparation of the book; structural formulas are employed only when necessary to clarify the structure of the compound; the course of the reaction under discussion. The numerical values of the various fundamental and derived constants are those deemed the best single value

**TEST FOR HONEY.** A solution of 10 g. silver oxide by adding sodium silver oxide by adding sodium solution. The silver oxide is dissolved in sufficient 10% hydroxide solution to make a solution of 115 ml. It is used in de-facial honey.

**AGENT FOR ALDEHYDES.** mercuric oxide with 100 ml. 5% sodium sulfite solution. This solution gives a white with dilute acetaldehyde and yde solutions and dilute alkali; not do so with formaldehyde.

for the element lithium.

**REACTION FOR POLY-.** Crystals of polyphenol give tic colors with a few drops of thiocyanate solution and 1 ml. d.

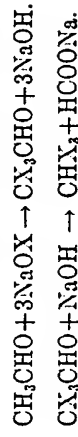
**REAGENT.** A mixture of a 10% aqueous solution of ferric id 58.2 ml. of a 10% aqueous f potassium thiocyanate with uke 100 ml., used as a test re-hydroxy acids. A yellow color is with this reagent by hydroxy

**RD TEST SOLUTION FOR** A solution of 1 g. tannin in r, to which is added 0.75 g. con-sulfuric acid, and the volume ith water to 50 ml. This reagent own precipitate with solutions caramel.

**EAGENT.** A solution of 10.08 g. n 500 ml. 96% alcohol, which is th a solution of 2.5 g. potassium in 100 ml. water and 100 ml. til it is alkaline to phenolphthal-ed solution (color due to phenol-is then diluted to 1 liter with t is used as a reagent for deter-tness of water.

excess of potassium hydroxide solution, solutions of proteins give a brown color changing to cinnamon color.

**LIEBEN IODOFORM REACTION.** A method of formation of haloforms by treat-ment with hypohalites, of acetaldehyde, methyl ketones, their halogenated deriv-atives, or compounds yielding them on reaction. The reaction is general for hy-pohalites, but derives its name from the "iodoform test" whereby the compounds listed above give the characteristic odor of iodoform with iodine in alkaline solution.



**LIEBEN REAGENT.** An aqueous solution of 2 g. iodine and 3 g. potassium iodide, in a total volume of 50 ml., used in detecting acetone or ethyl alcohol. Iodoform is pro-duced, in the presence of potassium hydrox-ide, if acetone is present.

**LIEBERMANN REACTION FOR PRO-TEINS.** Many proteins that have been washed with alcohol and with ether give a violet-blue color with hot concentrated hy-drochloric acid.

**LIEBERMANN REAGENT FOR THIO-PHENE.** A solution of 8 g. potassium nitrite in a mixture of 100 g. concentrated sulfuric acid and 6 ml. water, used in de-tecting thiophene in benzene. A green color, changing to blue, indicates the pres-ence of thiophene.

**LIEBERMANN TEST FOR CERTAIN STEROLS.** Characteristic colors are ob-tained when cholesterol and certain other sterols, when in saturated solution in acetic anhydride, are treated drop by drop with sulfuric acid.

**LIEBERMANN TEST FOR PHENOLS.** A characteristic series of color changes ob-tained by treatment of a phenol with sul-furic acid to which a little sodium nitrite has been added, and then by pouring the mixture into water and alkalinizing. Sim-ilar reactions are obtained with nitros-

with nitrous acid, the reaction also serves to establish the presence of a secondary amine.

**LIEBIG COMBUSTION.** The oxidation of organic substances for analytical pur-poses so that their carbon and hydrogen are quantitatively converted to carbon dioxide and water, respectively, and absorbed in suitable materials.

**LIEBIG CONDENSER.** See condenser, Liebig.

**LIEBIG REACTION FOR CYSTINE.** On boiling with a solution of lead oxide in aqueous sodium hydroxide solution, cystine gives a black precipitate.

**LIESEGANG RINGS.** The formation of a banded precipitate by ions which react by diffusion through certain gels. Thus, for example, if silver nitrate is dissolved in a warm gelatin sol which is then allowed to set, and a drop of sodium dichromate solu-tion is deposited on its surface, the resulting silver chromate precipitate will appear in the gel as a series of rings, with clear areas between them.

**LIESEGANG SOLUTION.** A mixture of 14 ml. of a 40% aqueous solution of potas-sium phosphate and 1 ml. of a 10% aqueous solution of cupric chloride, used as a reagent for gelatin. A violet color is obtained.

**LIESEGANG TEST FOR IRON AND COPPER.** To detect iron and copper in paper and animal tissues, saturate the material with potassium ferrocyanide solu-tion, dry, and expose to fumes of hydro-chloric acid. Brown or blue dots appear in a few hours if copper or iron is present.

**LIFETIME, MEAN.** The period of time, on the average, that an atom will remain in a given excited quantum state before undergoing a change, i.e., by emission of a particle or emission of radiation.

**LIFSCHÜTZ TEST REACTION FOR OLEIC ACID.** To a solution of 1 drop

acid in glacial acetic acid, then add 10-12 drops concentrated sulfuric acid. Decolori-zation on standing, followed by a violet to cherry-red color, indicates oleic acid.

**LIGASOID.** A colloidal system, in which the dispersed particles (or the dispersed phase) are liquid, and the dispersion me-dium (or the continuous phase) is gaseous.

**LIGHT.** Radiant energy in a spectral range visible to the normal human eye (approximately 3800 to 7800 angstroms). See also ultraviolet and infrared.

**LIGHT, DEPOLARIZATION FACTOR OF.** See depolarization factor of light.

**LIGHT FILTER.** A screen of a substance, solid, liquid or gas, which absorbs certain wave lengths of light and transmits others. Such a screen, or a number of screens, can be used to analyze light by separating the various wave lengths or wave bands.

**LIGHT METAL.** A metallic element of small density, commonly one with a density below four.

**LIGHT, MONOCHROMATIC.** Light which consists of only one wave length.

**LIGHT, POLARIZED.** Light consisting of vibrations in the same plane, or vibrations which follow certain uniformly-changing pathways. When the vibrations occur in a single plane the light is said to be plane polarized. If the vibrations of two plane polarized beams at right angles to each other are so timed that the resultant de-scribes a circular or elliptical path, the light is said to be circularly or elliptically polar-ized.

**LIGHT, TRANSMITTED.** Light that has traveled through a medium without being absorbed.

**LILENDAHL-PETERSEN REAGENT.** An aqueous solution of 6 g. sulfuric acid, 2 g. phosphomolybdic acid, and 6 g. kaolin

**OF COOLING.** An increase in heat content of a substance or system in temperatures on its cooling because of an internal change, comes an allotropic modification, which is an increase in heat content. See transition.

**OF CRYSTALLIZATION.** The increase in heat content of one mole of a substance attributable to its transformation to the crystalline state.

**OF DECOMPOSITION.** The increase in heat content when one mole of a substance is decomposed into its elements, equal in quantity, but opposite in the heat of formation.

**OF DILUTION, DIFFERENTIAL.** The increase in heat content of a system from addition of an infinitesimal amount of solvent to the solution.

**OF DILUTION, INTEGRAL.** The increase in heat content occurring when a fixed amount of the solvent is added to a solution. This quantity is called the heat of dilution (or the total heat of dilution) in contrast with the differential dilution.

**OF DISSOCIATION.** The increase in heat content occurring as a result of breaking apart of molecules or, in the rupture of valence linkages.

**OF EVAPORATION.** See heat of vaporization, latent.

**OF FORMATION.** The increase in heat content of the system when one mole of a substance is formed from its elements. If the physical state of the elements are not specified they are assumed to be in the state at which they normally exist at atmospheric pressure and ordinary temperature.

**OF FUSION, LATENT.** The increase in heat content when unit mass, or mole of a solid is converted into a liquid at its melting point (without change of temperature).

**HEAT OF HYDRATION.** The increase in heat content when one mole of a hydrate is formed from the anhydrous form of the compound, and from liquid water.

**HEAT OF HYDROGENATION.** The increase in heat content when one mole of an unsaturated compound is converted into the corresponding saturated compound with gaseous hydrogen.

**HEAT OF IONIZATION.** The increase in heat content accompanying the complete ionization of one mole of a substance.

**HEAT OF LINKAGE.** The bond energy of a particular valence linkage between atoms, as determined by the average amount of energy required to dissociate bonds of that type in one mole of a given compound. This is illustrated by the case of methane, in which the bond energy of the C-H bond is taken to be one-quarter of the heat required to dissociate one mole of methane into carbon and hydrogen atoms.

**HEAT OF NEUTRALIZATION.** The increase in heat content of a system undergoing a neutralization reaction involving molar quantities of reactants.

**HEAT OF RACEMIZATION.** The increase in heat content when one mole of an optically active substance changes to its racemic form.

**HEAT OF REACTION.** The increase in heat content resulting from a chemical reaction, dependent, of course, upon the amounts of the substances involved, which are assumed to be, unless otherwise specified, the number of moles in the equation of the reaction.

**HEAT OF SOLIDIFICATION.** The increase in heat content upon the formation of one mole of a solid from a substance commonly in the liquid state.

**HEAT OF SOLUTION, DIFFERENTIAL.** A partial differential quantity obtained by differentiating the total heat of solution (see heat of solution, integral) with respect to the molar concentration of one

centration of the other component or components, the temperature, and pressure remain constant.

**HEAT OF SOLUTION, INTEGRAL.** The difference between the heat content of a solution, and the heat contents of its components. This quantity is also called the total heat of solution.

**HEAT OF SUBLIMATION, LATENT.** The increase of heat content when unit mass, or one mole, of a solid is converted into a vapor under isobaric conditions.

**HEAT OF TRANSITION.** The increase in heat content when one mole of a substance changes to an allotropic form, at the transition temperature.

**HEAT OF VAPORIZATION, LATENT.** The increase of heat content when unit mass, or one mole, of a liquid is converted into a vapor at the boiling point, without change of temperature.

**HEAT PUMP.** An apparatus designed to convert mechanical energy into thermal energy, as, for example, by the compression of a gas.

**HEAT, RADIANT.** Heat energy that is transmitted from one place or object to another without direct contact transfer, as by transmission through space, or through matter without the transfer process being dependent upon absorption of the heat by the transmitting medium.

**HEAT, SPECIFIC.** Also called the specific heat capacity. The quantity of heat required to raise the temperature of unit mass of a substance by one degree of temperature. The units commonly used for its expression are the unit mass of one gram, the unit quantity of heat in terms of the calorie.

**HEAT SUMMATION, LAW OF.** See law of heat summation.

**HEAT TRANSFER, COEFFICIENT OF.** The rate of flow of heat through a medium

time, and per degree temperature difference. In the English system of units, the coefficient of heat transfer is usually expressed in B.T.U. per square foot per hour per degree Fahrenheit.

**HEAT TRANSFER SALT.** A mixture of salts, commonly 50% sodium nitrite and 50% potassium nitrate, used in molten form (melting point of this mixture 282°F.) as a heat transfer medium in high temperature processes.

**HEATH REAGENT.** A mixture of three solutions: a solution of 5 g. cupric sulfate in 15 ml. water, a solution of 5 g. stannous chloride in 10 ml. water, and a solution of 2 g. potassium iodide in 10 ml. water, plus 100 ml. ammonium hydroxide, used in testing for tungsten. A red ring test, given by the substance tested (in acetic acid solution) indicates the presence of tungsten.

**HEATING VALUE OF FOODS.** The amount of heat liberated by complete combustion of unit mass, commonly one gram, of a food. See heat of combustion.

**HEATING VALUE OF FUELS, FORMULAS.** The calorific value of fuels may be approximated from the analysis. If C, H, N, and O represent the percentage of carbon, hydrogen, nitrogen, and oxygen,

$$Q = \frac{S, 149C + 34,500H - 3,000(O - N)}{100}$$

(Mahl's formula)

Q, the heating value, is expressed in calories (15°) per gram.

**HEAVY CHEMICALS.** Chemicals that are produced, or were once produced, in very large quantities, such as sulfuric acid, caustic soda, chlorine, etc.

**HEAVY HYDROGEN.** See hydrogen, isotopes.

**HEAVY METAL.** A metal having a specific gravity greater than four.

HECHENBELIKNER CONCENTRATOR.